REMARKS

The Examiner has provisionally rejected claims 1-9 under the judicially created doctrine of obviousness-type double patenting. Accordingly, Applicant is filing a Statutory Terminal Disclaimer in accordance with 37 CFR § 1.321(c) to show common ownership and to overcome the double patenting rejection.

In the Office Action the Examiner rejected claims 1 – 2 as being unpatentable under 35 U.S.C. § 103(a) as being obvious over *A Method for Transmitting PPP over Ethernet (PPPoE)*, RFC 2516 (February 1999), Mamakos, et al. (Mamakos), in view of U.S. Pat. No. 6,711,166 to Amir, et al. (Amir) and further in view of U.S. Pat. No. 5,958,053 to Denker (Denker). Claims 3 – 9 were rejected as being obvious in view of *A Method for Transmitting PPP over Ethernet (PPPoE)*, RFC 2516, February 1999, Network Working Group of the Internet Engineering Task Force IETF, Mamakos, et al. (Mamakos) in view of U.S. Patent 6,711,166 to Amir et al. Claims 1 – 7 are also rejected on grounds of obviousness over Minami et al. ("Minami", U.S. Pat. No. 6,034, 963), in view of Lindsay ("Lindsay", U.S. Pat. No. 6,564,267). Claims 8 – 9 are rejected as being obvious over Minami in view of Lindsay, and further in view of U.S. Patent No. 6,636,505 issued to Wang et al. ("Wang").

Applicant respectfully traverses the rejections.

All of the rejections fall into two categories and, for each category, the rejections rely upon the combination of two or three references. As demonstrated herein, a person of ordinary skill in the art would not be motivated to combine the cited references. Before addressing each rejection, Applicant will first discuss the reasons why it would not be obvious to combine these references as suggested by the Examiner.

Category 1 References: Mamakos, Amir, and Denker

In Category 1, claims 1 and 2 stand rejected over the combination of Mamakos, Amir, and Denker. Claims 3 – 9 stand rejected over the combination of Mamakos and Amir. These rejections are found at p. 3 – 8 of the Office Action.

Mamakos teaches a method of transmitting datagrams using point-to-point protocol (PPP) over an Ethernet medium (PPPoE). The PPP protocol includes information in the form of an Maximum Receive Unit (MRU) field to notify the receiving host of the maximum size packet that should be transmitted over the link. The MRU field is included in the LCP configuration options that are included in a Configure-Request packet.

Because the MRU is specifically intended to provide maximum return packet size information, a person of ordinary skill in the art would use the MRU, as taught by Mamakos, to convey such information to the remote host. Neither Mamakos, nor Amir, nor Denker discloses the use of an MSS field in a TCP header to convey maximum packet size information. Mamakos, however, does explicitly teach the use of the MRU field (which is an option in the PPP header). Moreover, neither Mamakos, nor Amir, nor Denker discloses the sending of PPP packets over multiple-segment networks in which at least one segment does not use the PPP protocol and at least one segment does use the PPP protocol. As stated in the specification, Applicant's invention is directed to the situation in which a packet that is encapsulated within the PPP packet is destined for a device that lies beyond the network segment that is using PPP, and in which the PPPoE and PPP headers will be stripped before the packet reaches its destination. Specification, p. 8, lines 8 – 15. Neither Mamakos, nor Amir, nor Denker suggests such a network configuration, nor identifies any problem with such a configuration that might be solved by combining them. Accordingly, although it would be theoretically possible for a person of

ordinary skill in the art to "find" all of the elements required to come up with Applicant's invention in the cited prior art, there would be no incentive for one to do so.

Because there would have been no incentive for a person of ordinary skill in the art to combine Mamakos with Amir or with Denker, Applicant's invention would not have been obvious to such a person, and the Examiner is respectfully requested to reconsider and reverse his decision rejecting claims 1 – 9 over the prior art of Mamakos in view of Amir and/or Denker.

Category 2 References: Minami, Lindsay, and Wang

In Category 2, claims 1 -7 have been rejected over the combination of Minami in view of Lindsay. These rejections are found at p. 9 – 14 of the Office Action. Claims 8 – 9 are rejected over the combination of Minami in view of Lindsay and further in view of Wang.

Minami discloses a multiple network protocol encoder/decoder and data processor. Although Minami discloses PPP as one of the network protocols that can be processed by the apparatus of the invention, it does not disclose any means for limiting the size of packets being processed. That is, neither the MRU field of the PPP header, nor the MSS field of the TCP header are mentioned by Minami. Although Minami discloses various network layer protocols, PPPoE (point-to-point protocol over ethernet) is not one of them. Other than showing a number of physical media in Fig. 3 (without explanation), Minami does not disclose any particular physical medium nor any data link layer configurations. The only relevant aspect of Minami to Applicant's invention is its teaching of the encapsulation of a TCP packet within a PPP packet. The Examiner's statement, at p. 9 of the Office Action, that, "Minami teaches a method for transmitting data across a network having an ethernet network segment using point-to-point protocol (PPP) (Fig. 1)," is not supported by the reference. Although Fig. 3 of Minami shows "Ethernet" along with "ISDN," "Cable Modem," and "Modem" as being outside the apparatus of

Minami's invention, Minami does not "teach a method" for transmitting data across a network having an ethernet segment. A person of ordinary skill in the art would not find it obvious to use PPP over ethernet from the disclosure of Minami.

Lindsay is a network adapter with large frame transfer emulation. Lindsay discloses using a network adapter to modify the MSS segment of a TCP SYN packet to convey packet size information to local and remote hosts. In TCP packets sent to the local host, the MSS is purposely made larger than the network maximum transmission unit (MTU). However, in TCP packets sent to the network, the MSS is used to notify the remote host of the actual MTU for the network. The result is that much of the packet framing work can be transferred from a main process to the network adapter. By informing the local host that the packet size is larger than the actual MTU for the network, that the main processor will send large data packets to the network adapter where they will be down-sized and framed for transmission over the network.

Lindsay is not concerned with, and does not disclose the use of PPP. Lindsay is concerned primarily with selecting appropriate sizes for data packets that may be received by the network adapter from the local host, or that will be sent from the network adapter to a remote host. While Lindsay does use the MSS field of the TCP header to convey packet size information, such use is conventional, and conforms to the standard use of the MSS field to convey packet size information in TCP sessions. Nothing in Lindsay discloses or suggests using the MSS field as a substitute for the MRU field of a PPP packet.

Because Minami does not disclose any information regarding the packet size for a PPP transmission, and because Lindsay does not disclose using the MSS field together with PPP, there is no motivation for a person of ordinary skill in the art to combine Minami and Lindsay to arrive at Applicant's invention. Neither Minami nor Lindsay discloses the use of PPP over

networks having multiple segments that use multiple protocols. Neither Minami nor Lindsay discloses the possibility that a PPP packet may have its header information stripped, and may therefore fail to convey maximum packet size information to a remote host. In the absence of at least some suggestion that Minami and Lindsay should be combined, a person of ordinary skill in the art would not combine them, and would not find Applicant's invention to be obvious in view of the combination.

Detailed Response

According to the Examiner, in claim 1, Mamakos teaches a method of transmitting data across a network having an ethernet network segment using point-to-point protocol (PPP), comprising the steps of:

(i) comparing the MSS value contained in said TCP header with a predetermined decimal number that is no larger than the decimal number 1452 (page 7);

(ii) if said MSS value is larger than said predetermined decimal number, substituting the predetermined decimal number into said MSS value (page 7); and

(iii) transmitting said packet to said network for routing to a destination (Discovery Stage, page 4).

Despite the Examiner's observation, Mamakos does not teach using the MSS value to establish packet size. Rather, Mamakos teaches setting the value of the Maximum-Receive-Unit (MRU) option of the PPP header to 1492 so that the maximum payload will not exceed the 1500 byte ("octet") total limit for an ethernet packet. The distinction between MSS and MRU is important, since the MRU is part of the PPP header, and exists only during the packet's transit of the PPP portion of the ethernet network. It will be lost if the PPP header should be stripped from the packet midway along the entire multiple network path to the receiving machine. See

Specification, p. 8, lines 8 – 15. Thus, although limiting the MRU option to 1492 bytes will result in adequate PPPoE communications across the PPP segment of the ethernet network, the MRU information will be lost when the PPP header is stripped during transit across multiple network segments using other low-level transmission protocols. It is in this environment that Applicant's invention is intended to operate.

The MSS field, however, can exist only within a TCP header. Mamakos teaches the use of point-to-point protocol over Ethernet (PPPoE), but does not disclose whether or not a TCP packet exists within the PPPoE packet. There is no requirement that a PPPoE datagram must include a TCP packet within it. Because every PPPoE packet is not required to have an encapsulated TCP packet, it would not be obvious to a person of ordinary skill in the art that an MSS field would be available in a PPP packet, or that a maximum return packet size value could be placed in an MSS field.

In contrast to Mamakos, Applicant's invention is intended to provide packet size information to a receiving host after the packet has transited an indefinite variety of networks, of which a PPP segment constitutes one part. As is depicted in Figs 1 and 2 of Applicant's drawings, the TCP header and payload are encapsulated within an IP packet that is, itself, encapsulated within the PPP packet. Thus, although the PPP header may be stripped from the datagram during transit, information contained within the TCP header remains intact and available when the packet reaches its final destination. Applicant's invention enables the receiving host to obtain packet size information by placing that information within the TCP header, in the optional MSS field. According to Applicant's invention, this information is transmitted in the TCP SYN packet that initiates TCP communications with a remote site. By analyzing the MSS field, the receiving host is informed of the maximum packet size that may be

sent to the sending host. Because the information provided by Applicant's invention is found within a TCP header encapsulated within an IP packet, it must compensate for the sizes of the TCP and IP headers by subtracting an additional 40 octets from 1492, to arrive at 1452 octets.

Mamakos does not teach the use of the MSS portion of the TCP header for providing this information. Applicant's invention addresses and provides at least a partial solution to a well-recognized problem. The rejection does not indicate why a person of ordinary skill in the art would find it obvious to substitute using the MSS when Mamakos specifically uses only an MRU, and does not mention the MSS. A person of ordinary skill in the art would not find Applicant's invention to be obvious in view of Mamakos.

The Examiner has also cited Amir (U.S. Pat. No. 6,711,166) as teaching the analysis of an IP packet to determine whether a TCP packet has been encapsulated within a PPP packet within an IP packet. Amir discloses that a TCP packet may be encapsulated within an IP packet at col. 1, lines 51 – 53. Amir also discloses the initiation of a TCP transmission through the use of a synchronization signal (col. 2, lines 12 – 14), and suggests (but does not teach) that the underlying network for transmission may be an ethernet or a PPP. Amir does not, however, disclose the use of PPP over ethernet, and does not disclose Applicant's method of setting the optional MSS field of the TCP header to 1452 bytes when a SYN packet is being sent. Moreover, nothing in Amir suggests that a person of ordinary skill in the art find it obvious to substitute the MSS instead of the MRU specified by Mamakos.

The Examiner has also cited Denker (U.S. Pat. No. 5,958,053) for teaching the determination whether the SYN flag within the TCP header has been set. Although Denker does disclose the determination of whether the SYN flag has been set, and further discloses the use of the MSS field of the TCP header to inform the receiving host of the maximum size of packet that

the sending host will accept (col. 4, lines 3 – 7), Denker does not suggest using the MSS field to provide a maximum packet size where the MSS is determined solely by whether the transmission path includes a PPP segment. In fact, Denker does not mention PPP in any context. Accordingly, there is nothing in Amir or Denker to suggest combining their teachings to develop a process for sending PPP over ethernet.

The Examiner also rejected claim 2 over the same prior art, and under the same analysis, as was applied to claim 1, namely, reliance upon Mamakos as teaching the use of the MRU in the PPP header to provide maximum packet size information across the PPP segment of an ethernet network. For the same reasons as state above, claim 2 is not obvious in view of Mamakos, Amir, and Denker. The Examiner's statement that one of ordinary skill in the art would have been motivated to combine Mamakos, Denker, and Amir in order to provide a method of transmitting data packets across a network does not give any reason why those references would be combined, and further does not provide reasons why a person of ordinary skill would find it obvious to substitute a value in the MSS instead of putting the maximum packet size in the MRU of Mamakos.

It should be noted that the MRU that is disclosed by Mamakos is the intended field for including a maximum size for a return packet in a PPP transmission. Unless a person of ordinary skill is particularly motivated to use some other means for providing that information, that person would not be expected to put the information in the MSS field rather than in the MRU field. Applicant's invention is directed to the specific and possibly uncommon configuration in which a multi-segmented path across a network includes at least an Ethernet segment over which PPP will be transmitted, and at least one other segment in which the PPP header will have been stripped. Neither Mamakos, Amir, nor Denker discloses a network having that configuration or

identifies such a network as requiring special treatment to ensure that data in PPP packets are not lost. In the absence of a disclosure of that network configuration by Mamakos, Amir, or Denker, the Examiner's position, that a person of ordinary skill in the art would find claims 1 – 2 to be obvious, is not supported by any motivation for such a person to use the MSS field, rather than the MRU field.

Claims 3 – 9 are rejected as being unpatentable for obviousness under Mamakos in view of Amir. At p. 5 of the Office Action, with respect to claim 3, Mamakos is said to teach the method for transmitting data across a network having an Ethernet network segment in which each identified TCP packet is examined to determine whether it contains an MSS field, and the MSS value is compared with the number 1452, and the smaller of the compared values is substituted in the MSS field.

As previously noted, Mamakos does not teach using the MSS field in the TCP header. Mamakos cites only the MRU field, which is in the PPP header, and does not suggest using any other field for communicating maximum return packet size. A person of ordinary skill in the art would not find anything in Mamakos to suggest using the MSS field, rather than the MRU field, to convey maximum packet size information. Although Amir does disclose the encapsulation of a TCP packet within an Ethernet packet, Amir does not disclose the necessary network configuration for the invention claimed in claim 3, and offers no suggestion to a person of ordinary skill in the art to use the MSS field rather than the MRU field for PPP transmissions. There is nothing disclosed in either Mamakos or Amir to suggest that combining them will solve the problem that is addressed by Applicant's invention as claimed in claim 3.

At p. 6 of the Office Action, the Examiner addresses claim 7, finding that Mamakos teaches all of the limitations of claim 7, including "comparing the value in said MSS field with

the decimal number 1452 . . ." As noted above, Mamakos does not mention the MSS field in the TCP header, but deals only with the MRU field in the PPP header. Moreover, Mamakos does not use the decimal number 1452, but substitutes the decimal number 1492 into the MRU. A person of ordinary skill in the art would not find claim 7 to be obvious in light of Mamakos.

At p. 7, the Examiner states that Mamakos does not explicitly teach determining whether said packet contains an encapsulated TCP packet, and that Amir does teach determining whether said packet contains an encapsulated TCP packet. However, as previously noted, the Examiner cites no basis why a person of ordinary skill in the art would be motivated to combine Mamakos and Amir. Neither Mamakos nor Amir discloses the network configuration of multiple segments using different protocols that is the basis for Applicant's invention. Moreover, as noted earlier, the Examiner has presented no reason why a person of ordinary skill in the art would not simply include the maximum size for a return packet in the MRU field of the PPP header.

Regarding claim 8, at p. 7 of the Office Action, the Examiner stated that it would have been obvious to a person of ordinary skill in the art to combine Mamakos and Amir to teach the use of an MSS field in a TCP packet. As before, although the encapsulation of a TCP packet within a PPP packet, and the encapsulation of a PPP packet within an Ethernet packet may be obvious in view of Mamakos and Amir, the Examiner has given no reason why a person of ordinary skill in the art would select an MSS field of a TCP packet to include the maximum size for a return packet where the MRU field specifically designated for that information is present. If the combination of Mamakos and Amir do not disclose or teach the transmission of information over multiple segment networks having different protocols, including a PPP segment, then there is simply no reason why those references should be combined as determined by the Examiner.

At p. 8 of the Office Action, the Examiner stated that claims 4, 6 and 9, which require the substitution of the number 1452 into the MSS field, are obvious in view of Mamakos. Again, as Mamakos discloses only the use of the MRU, and does not mention the MSS field, a person of ordinary skill in the art would not find it obvious to use the MSS field in view of Mamakos.

At p. 9 of the Office Action, the Examiner rejected claims 1 – 7 under prior art to Minami in view of Lindsay.

With respect to claim 1, the Examiner stated that Minami teaches a method for transmitting data across a network having an ethernet network segment using point-to-point protocol (PPP) comprising the steps of: identifying each packet having a TCP packet encapsulated within a PPPoE packet that is to be transmitted across said network; and transmitting said packet to said network for routing to a destination. Although Minami does not teach the checking of the SYN flag to determine whether it is set, and comparing the MSS value with a predetermined number that is not larger than 1452, Lindsay is said to teach those steps. According to the Examiner, it would have been obvious to one of ordinary skill in the art to modify the method of Minami to determine the status of the SYN flag, and to modify the MSS as taught by Lindsay in order to send data. Moreover, the Examiner stated that a person of ordinary skill in the art would have been motivated to combine Lindsay and Minami to provide a method to send large amounts of data.

Lindsay does not modify the MSS segment as claimed in claim 1. Specifically, claim 1 specifies a value of 1542 whereas the value of the MSS used by Lindsay is not dependent upon whether a PPP transmission is being sent over Ethernet, but is determined by other factors. At least one of those other factors relates to the desired segment size being sent by the host to the large frame network adapter of Lindsay. According to Lindsay, col. 2, lines 24 – 33:

"the network adapter intercepts connection negotiation packets passing between the transmission control protocol layer and a remote endpoint. The network adapter modifies the maximum segment size of the packets as necessary such that the transmission control protocol layer receives an indication that the remote end point has accepted a first maximum segment size for the connection, and the remote endpoint receives an indication that the host computer has accepted a second, smaller maximum segment size for the connection."

In contrast to Lindsay, claim 1 first requires the identification of a TCP transmission that will cross an Ethernet network segment using point-to-point protocol. Upon identifying such a transmission, claim 1 requires the existing MSS to be compared to an absolute number, 1452 (decimal), and, if the existing MSS is larger than 1452, replacing the MSS value with 1452. Nothing in Lindsay discloses the limitation of identifying an Ethernet segment over which PPP data will be transmitted, and nothing in Lindsay suggests comparing the existing MSS value with the absolute number 1452. A person of ordinary skill in the art would not find these limitations to be obvious in view of Lindsay combined with Minami.

Although one seeking to send "large amounts of data" might be motivated to combine Minami and Lindsay, such is not a purpose for Applicant's invention. One seeking to send large amounts of data would not be motivated to use a connection medium having a point-to-point protocol (PPP) serial link segment as such segments typically are used in lower-transmission rate communications. PPP provides a standard for transporting higher-level protocols between two peer devices. Specification, p. 7, lines 1 – 2. PPP is best known for use in telephone or ISDN dial-up links, or DSL connections between individual computers and ISPs. Specification, p. 7, line 8. PPP lends itself to methods of access control, billing functionality, and type of service

demands which are specific to "two-party" networks, and are not available in traditional ethernet networks. Specification, p. 7, lines 14 – 17. The motivation for applicant's invention is to provide reliable communications across networks having a number of segments using different protocols. As stated in the specification, p. 3, lines 1 – 10:

> "Because each packet of information is discretely routed from source to destination, packets may follow different paths, depending upon network conditions. While most networks comprising the internet are high speed networks, using protocols such as ATM and the like, conditions occasionally arise in which other, slower transmission protocols and media are used. Under some circumstances, passage across a network may involve a packet's being transmitted across an ethernet network using point-to-point protocol ("PPP"). such protocols may be found in dial-up networks, ISDN, and, more recently, DSL networks, and are frequently used to connect individual devices to an internet service provider. When this combination of protocols is used, it is not uncommon for difficulties to arise that culminate in the loss of transmitted data."

A person of ordinary skill in the art who is motivated to overcome data transmission losses and other difficulties associated with data transmissions across network segments having different protocols, including the use of a PPP serial segment, would not be motivated to combine Lindsay and Minami. Lindsay discloses an apparatus that permits a host to download large segments of data to the apparatus, leaving it to the apparatus to break the large transmission into segments sizes appropriate for transmission to a remote site. Although Lindsay manipulates the MSS to "fool" the host machine into sending larger segments than the network can handle, Lindsay does not disclose the use of such apparatus with PPP, nor does Lindsay suggest that

such apparatus would improve the reliability of PPP communications. Minami discloses a multi-protocol network encoder/decoder that can process transmissions occurring in any protocol, including PPP. Although Minami can process PPP transmissions, it is not directed to PPP any more than any other protocol, and there would be no particular motivation for a person of ordinary skill in the art to look to Minami, or to combine Minami with Lindsay, in an attempt to overcome difficulties related to transmissions over multiple network segments using multiple protocols.

At p. 10 of the Office Action, the Examiner rejected claim 2 on the same grounds as were cited for the rejection of claim 1. For the same reasons as are given to show why a person of ordinary skill in the art would not find claim 1 to be obvious, claim 2 is also unobvious. That is, Lindsay does not determine a value for the MSS segment based upon the presence of a PPP header and a TCP header, but uses other criteria that have no application to claims 1 or 2.

With respect to claims 3, 5 and 7, as noted by the Examiner, at p. 10 of the Office Action, Minami in view of Lindsay does not explicitly teach for each identified TCP packet, determining whether the value in said MSS field is larger than the decimal number 1452; and if said value is larger than the decimal number 1452, substituting a predetermined number no greater than 1452 into the MSS field.

Lindsay is said to determine, for each identified TCP packet, whether the header of the packet contains an MSS field, and further determining whether the value in said MSS field is larger than the decimal number 1452 and, if said value is larger than 1452, substituting a predetermined number no greater than 1452 into the MSS field. According to the Examiner, the combination of Lindsay and Minami makes claims 3, 5 and 6 obvious.

As noted earlier, there is nothing in Minami or Lindsay that would motivate a person of ordinary skill in the art to combine them, or to apply them to PPP network segments as is required for claims 3, 5 and 7. In the absence of a reason for combining them, a person of ordinary skill in the art would not find claims 3, 5 and 7 to be obvious.

At p. 11 of the Office Action, the Examiner rejected claims 4 and 6 on grounds that the decimal number 1542 is disclosed by Lindsay. The cited portion of Lindsay, however, discloses only that the MSS may be set to 1460, which is given as an example of the ethernet maximum for TCP/IP packets. However, 1460 is not the number used in claims 4 and 6, and the ethernet maximum applicable to claims 4 and 6 is 1452, not 1460. A person of ordinary skill in the art would not find it obvious to use 1452 in view of Lindsay's teaching that 1460 is "the Ethernet maximum for TCP/IP."

At p. 12 of the Office Action, the Examiner rejected claims 8 – 9 under Minami in view of Lindsay and further in view of Wang. In claim 8, according to the Examiner, Minami teaches a machine readable storage having a program for transmitting PPP over an ethernet network comprising a TCP packet buffer, an encapsulator configured to encapsulate TCP-formatted packet within an IP packet, and to encapsulate an IP packet within the payload of a PPP packet, and an ethernet transmitter. Lindsay is said to teach a comparator configured to determining whether the header of a TCP formatted packet contains an MSS field, and to teach an MSS setter configured to set the MSS field to a value ranging from zero to 1452.

As noted earlier, Lindsay does not recite the value 1452. Lindsay recites only the value that is appropriate for TCP packets that do not use PPP – that is, 1460, rather than 1452. As such, Lindsay teaches away from the use of PPP as a network protocol used together with TCP.

Wang is also cited as teaching the encapsulation of a PPP packet within a payload of a PPPoE packet, and to encapsulate a PPPoE packet within an Ethernet payload. Wang, however, is unconcerned with maximum packet sizes, and provides no suggestion for using the MSS field of a TCP packet to convey packet size for a PPP packet.

As neither Minami, nor Lindsay, nor Wang suggests the use of PPP over multiple segment networks using different protocols, and none of them discloses even the use of the MRU field to limit packet sizes, there would be no incentive for a person of ordinary skill in the art to combine these references to arrive at the invention claimed in claims 8 or 9. In the absence of a disclosure by any of these references of the stripping of a PPP header during transit of a TCP packet across multiple segment networks, a person of ordinary skill would not find it obvious to combine them, and it would not be obvious that the maximum segment size for a PPP transmission should be placed in the MSS header of an encapsulated TCP packet.

In view of the foregoing arguments, Applicant respectfully requests that the Examiner reconsider his rejections of claims 1 – 9, and that he reverse his decision and enter a Notice of Allowance for claims 1 – 9.

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Respectfully submitted,

Michael C. Cesarano, Reg. No. 31,817
AKERMAN SENTERFITT
1 S.E. 3rd Avenue, 28th Floor
Miami, Florida 3313101714
305-374-5600 Telephone
305-374-5095 Telefax
michael.cesarano@akerman.com